# 1AC Hegemony Advantage

### Scenario 1- The Navy

**Biofuels increase the Navy’s operational readiness and power projection**

**Ivey 6/10** (Lt. Richlyn Ivey, Office of the Assistant Secretary of the Navy for Energy, Installations and Environment, sde, 6/10/14, “Department of the Navy Seeks Biofuels on a Large Scale”, http://www.navy.mil/submit/display.asp?story\_id=81565

**In a major step for the Department of the Navy's efforts to increase operational readiness and mission effectiveness by reducing its reliance on petroleum,** at least 37 million gallons of drop-in **biofuels are being sough** as part of its F-76 marine diesel and JP-5 shipboard jet fuel supply in the upcoming Inland/East/Gulf Coast bulk fuels solicitation released by the Defense Logistics Agency (DLA) Energy on June 9. Bids are due by July 9, and deliveries of fuel will start April 1, 2015. The Inland/East/Gulf Coast is the single largest bulk fuels acquisition program, and is valued in excess of $3.5 billion.   **The biofuels sought can be blended** in a range of 10 to 50 percent **with conventional petroleum products and must meet all military fuel specification properties** which make handling requirements and performance indiscernible to the end user. Currently, two biofuels pathways have been tested and qualified for use in Navy and Marine Corps aircraft, ships, vehicles and equipment and efforts are underway to adopt more pathways.   DLA will purchase the biofuel blends only if they are cost competitive with their conventionally-derived counterparts. $27.2 million in US Department of Agriculture (USDA) Commodity Credit Corporation (CCC) funds, capped at 71 cents or less per neat biofuel gallon, are available to defray any additional costs that may exist for fuels derived from domestic feedstocks on a USDA-approved list.   **Expanding military energy sources improves the reliability of our overall fuel supply, adds resilience against supply disruptions, and gives the military more fuel options to maintain its readiness and defend the national security interests of the United States**

#### Biofuels will help the Navy respond faster- this guarantees naval power projection and hegemony

#### Global Security 11 (Globalsecurity.org, last modified: 5/7/11, sde, “Maritime Power Projection”, <http://www.globalsecurity.org/military/ops/maritime-power-projection.htm>)

#### The US Navy Strategic Planning Guidance focuses on two overarching strategic concepts - Forward Presence and Knowledge Superiority-and three operational concepts - Battlespace Control, Battlespace Attack, and Battlespace Sustainment - by which Maritime Power Projection is achieved. Maritime power projection is power projection in and from the maritime environment, including a broad spectrum of offensive military operations to destroy enemy forces or logistic support or to prevent enemy forces from approaching within enemy weapons' range of friendly forces. Maritime power projection may be accomplished by amphibious assault operations, attack of targets ashore, or support of sea control operations. The foundation of maritime power projection is robust and credible naval expeditionary forces present forward where vital interests-economic, political, and military-are most concentrated. They provide a security framework that complements other instruments of national power to build stability and favorably shape regions of interest. In cooperation with friends and allies, forward-deployed forces discourage challenges to shared interests. Through combat-credible forward presence-including that of strategic nuclear forces-naval forces deter aggression. Through engagement, critical partnerships are developed and interoperability enhanced with allies and potential coalition naval, air, and ground forces. Combat-ready naval forces provide both a unique understanding of an emerging crisis and the means for timely, and when necessary, independent response. Should combat operations by joint and coalition forces be required to resolve conflict, the early, sustained response of combat-credible naval expeditionary forces will have shaped the battlespace to the advantage of US forces. Knowledge superiority is the second key enabler that underpins maritime power projection. Through exploitation of technology and parallel improvements in organization and processes, naval forces will achieve an unprecedented awareness and understanding of the future battlespace. Information, however, will not improve awareness unless it is provided real-time as the knowledge required by commanders to make timely and informed decisions. Improvements in information technology, matched by an agile and adaptive command organization, will provide dispersed and highly mobile naval forces dramatically enhanced knowledge of the battlespace. The resultant acceleration of our decision-making process will place us inside an adversary's engagement timeline. US combat credibility in the information age will depend as much on speed of command as on weapon or platform. Networked operations will improve operational tempo and provide the knowledge to maneuver or produce effects to effectively "lock out" a foe's intended actions and overcome his anti-access strategy. Three components of maritime combat power are the ways we exploit the capabilities of our naval forces. These ways are: battlespace control, battlespace attack, and battlespace sustainment. The battlespace-determined by our widely dispersed, networked forces and their organic and joint sensor and weapon reach-is the only appropriate dimension in which to consider the boundaries of control, attack, and sustainment. Naval expeditionary forces must be able to operate seamlessly throughout the battlespace, transitioning smoothly from peacetime presence or other expeditionary operations to large scale forcible-entry operations as volatile political factors may dictate.

### Scenario 2- Airlines

#### High oil prices will kill commercial airlines

Milmo 11 (Dan Milmo, transport correspondent in Singapore, 6/6/11, sde, “Oil prices pose threat to airlines’ profits and survival, IATA warns )

Airlines have slashed their global profit forecast in half after warning that high oil prices, the Japanese tsunami and the Arab spring will remove $4bn (£2.43bn) from the industry's bottom line this year. Willie Walsh, chief executive of British Airways and Iberia parent International Airlines Group, warned that European carriers will bear the brunt of the impact from high fuel costs, with some operators going out of business. The International Air Transport Association (IATA) said carriers will make a worldwide profit of $4bn this year, down from a previous estimate of $8.6bn. After recording a net profit of $18bn last year, the industry is slipping perilously close to its loss-making years of 2008 and 2009, with a profit margin of just 0.7% expected in 2011. Asked if some carriers will go under, as happened to dozens of airlines in the wake of the 2008 oil spike when prices hit $147 a barrel, Walsh said: "I fully expect that to happen." Referring to the current price for Brent crude of $115 a barrel, he added: "I think the high oil price is something that poses a real challenge to the industry. There are lots of airlines that will struggle in a high oil price environment." Fuel will account for nearly a third of industry costs this year. Walsh said the world economy was in better shape than during the previous oil spike, but Europe is in a weaker state than the Americas and the Asia-Pacific regions. "Some will suffer more than others, such as those airlines operating in economies that are weaker. The strength of the global economy is driven by Asia and Latin America to a large degree so airlines operating in those areas will be less affected than airlines operating in a European context. It is likely to have more of an impact in Europe than in other parts of the world." Giovanni Bisignani, IATA chief executive, again called on governments to cut aviation levies which are expected to cost carriers in the UK, Germany and Austria a combined $6bn this year. "Don't kill the goose that lays golden eggs," he said. "Aviation facilitates the global trade that is stimulating economies and restoring government budgets. Tax the bankers who created the mess. Their billions of dollars in bonuses should help clean it up," Bisignani said. The IATA forecast predicts a slowdown in leisure air travellers as higher oil prices push up fares, but business class travel is expected to grow by up to 6% due to "growing world trade and business investment". However, the mismatch between capacity growth and demand, a historic bane of the industry, is set to continue with passenger growth of 4.7% to be outstripped by a 5.8% increase in the amount of seats flown. This puts pressure on fares, as more flights compete for the same amount of passengers, which in turn hits bottom lines already struggling with the impact of higher fuel costs.

#### And air power is key to power projection – that solves conflict escalation and nuclear war

Wyne, 8 – Michael W. Wynne, Secretary of the Air Force [“Sovereign Options: Securing Global Stability and Prosperity A Strategy for the US Air Force”, Air University, Strategic Studies Quarterly, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA508798&Location=U2&doc=GetTRDoc.pdf>]

Over the last century, the scope of US international responsibility has vastly increased, but the Constitutional imperatives that guide our military’s mission remain unchanged. When scholars look at the role the United States has played in the international system since WWII, they sometimes compare it to the Pax Romana or the Pax Britannica of previ­ ous centuries. here is some truth to this, but if there is an American Pax, it is a very generous one; the sort that seeks to increase the well-being and liberty of all who wish to join and asks only that those who do not join refrain from using violence against those who do. The benefits the international system derives from US leadership are impressive. For over half a century, the United States has been the world’s foremost defender of international stability and has taken the leading role in building and leading the coalitions that preserve it. This leadership led to the fall of the Nazi and Soviet regimes and provided the stable backdrop against which countries like Japan, Germany, and China initiated their economic miracles. It also contributed to 60 years without major-power war, the establishment of open international trading relations, and the unprecedented spread of democratic governance. Unfortunately, in the current era, many have become so accustomed to global stability that they wonder why the United States continues to invest in its armed forces. Over the last two decades, we have allowed our strategic forces to atrophy as our major-power competitors have increased their own; and we have readily discussed peace dividends as we stretched our combat forces to the breaking point. It is true there is a great deal of goodwill in the international system to­ day, yet the current security and prosperity enjoyed by those living within the borders of the United States and its allies are based on more than good­ will. Major-power competitors regularly probe US defenses in the air and continuously attack our military infrastructure in cyberspace. Mid-range competitors persistently purchase technologically advanced surface-to-air missiles and fighters that undermine our deterrent forces. Numerous ac­ tors have the capability and desire to disrupt the existing system. Since the last days of the Cold War, US-led coalitions have fought wars in six countries—Panama, Kuwait, Bosnia, Serbia, Afghanistan, and Iraq—and participated in many other military operations. Perhaps more important than the wars we have fought over the last two decades are the wars we have not fought. It has been many years since an opposed major power threatened us directly. Our globally deployed forces, our alliances and coalitions, and the quality and quantity of our strategic forces signal states around the world that aggression does not pay. This type of peace through strength was the dream of the League of Nations and later of the United Nations, but neither organization achieved the consensus necessary to carry out its vision. Today the United States, acting with allies or ad hoc coalitions of the willing, has let both the peaceful and violent states of the world know through its action that we will preserve peace. The impact of this deterrent presence cannot be overstated. In most regions of the world, peaceful states no longer feel the need to build large armed forces to defend against bellicose neighbors, and many potentially revisionist states understand that the resource requirements to compete militarily with the United States are too high—our own capability deters such conflicts from even emerging. While we fight vicious battles on the frontiers, we must not forget that the zone of stability we have created through our vigilance and forward presence is the largest in history. This is not a responsibility the United States can shirk or hand of to another state or organization. No other country in the world today is able to pick up the US leadership mantle. No other country or coalition is able to project power globally; nor could anyone else develop that capability in the face of the current anti-air and anti-sea threat environment. From one perspective, America’s existing global power projection capability is a unique historical accident. At a time when the United States controlled almost half of the world’s GNP, it also faced a bellicose Soviet Union. This combination led the United States to spend unprecedented sums on its strategic forces (approximately half of its robust defense budget on the Air Force alone). The global web of bases, air refueling aircraft, strategic bombers, satellites, and air superiority technology has served us well for half a century. Like the legendary Roman roads that enabled the Pax Romana, or the fleet and global network of naval bases that underwrote the Pax Britannia, US airpower vastly magnifies our ability to project power beyond our borders. Maintaining these strategic forces carries a price tag, but the United States does not fight so regularly or deter so thoroughly for purely altruistic reasons. Without the peaceful environment facilitated by American diplomacy and arms, the United States would not enjoy its current level of security and prosperity. The security and economic health of the United States are closely intertwined with the stability and prosperity of the international system. Our citizens enjoy peaceful lives at home because no major power believes it can challenge us and win; they prosper because we protect the global commons. The United States cannot neglect its position of leader­ ship without grave consequences. When Rome surrendered its mantle of leadership, the lights went out in Europe for a thousand years. Between the time the British Empire declined and the United States rose, the world fought two world wars and numerous lesser conflicts. It is true that the role the US military plays in the world today carries a price tag, but is more than worth the cost. The Threats We Face In the current international system, the United States and its allies face two principal threats. The first comes from major-power opponents with access to modern conventional and nuclear weapons. It is easy to di­ miss the possibility of major-power war in today’s peaceful system, but big wars, with their apocalyptic potential for suffering and destruction have a tendency to happen unexpectedly. Even when they do not occur, America’s opponents often base their demands on their perception of our ability to fight and win wars. Such major conventional or nuclear wars are by far the gravest military threat we face, and the perception that we are too weak to stand behind our global commitments is the surest route to such a war. Above all, the US military must prevent major-power opponents from believing they can benefit from using their military power against America’s vital interests.

#### US hegemony prevents war

Lind ’07 (Michael Lind, Co-founder of the new America foundation, 6/2007,sde, “Beyond American hegemony”, http://www.newamerica.net/publications/articles/2007/beyond\_american\_hegemony\_5381)

American military hegemony in Europe, Asia and the Middle East depends on the ability of the U.S. military to threaten and, if necessary, to use military force to defeat any regional challenge-but at a relatively low cost. This is because the American public is not prepared to pay the costs necessary if the United States is to be a "hyperpower." Given this premise, the obsession with the non-proliferation of nuclear weapons and other Weapons of Mass Destruction (WMD) makes perfect sense. WMD are defensive weapons that offer poor states a possible defensive shield against the sword of unexcelled U.S. conventional military superiority. The success of the United States in using superior conventional force to defeat Serbia and Iraq (twice) may have accelerated the efforts of India, Pakistan, North Korea and Iran to obtain nuclear deterrents. As an Indian admiral observed after the Gulf War, "The lesson is that you should not go to war with the United States unless you have nuclear weapons." Moreover, it is clear that the United States treats countries that possess WMD quite differently from those that do not. So proliferation undermines American regional hegemony in two ways. First, it forces the U.S. military to adopt costly and awkward strategies in wartime. Second, it discourages intimidated neighbors of the nuclear state from allowing American bases and military build-ups on its soil.

# Biofuel Advantage

## Navy

### Navy Wants Biofuel

#### Navy wants to make a transition to biofuels

**Erwin 14 (Sandra Erwin, Editor of national defense magazine, 1/20/14, sde, “Navy to Stay on Course with Biofuels”,**<http://www.nationaldefensemagazine.org/blog/Lists/Posts/Post.aspx?ID=1386>**)**

**Green fuels command small money** by Pentagon standards**. But there will be a big payday for producers** eventually, insist U.S. Navy officials. **The Navy needs the biofuel industry** to believe this in order to achieve Secretary Ray Mabus’ goal **to replace half of the Navy’s conventional fuel supply with renewables by 2020.**But with just six years to go, the industry and the government remain stuck in the proverbial chicken-or-the-egg conundrum. **The Navy says it is ready to buy hundreds of millions of gallons of fuels as soon as they are price competitive with petroleum, but the industry needs massive cash infusions to scale up production and drive down cost.**Mabus says the Navy is doing its part to prop up the industry. Under a 2011 presidential directive, **the Navy teamed with the Energy and Agriculture Departments and committed $510 million toward the development of a national biofuel industry.** The Pentagon claimed authority to do this under the Defense Production Act, which Congress passed in 1950 as a vehicle to fund struggling industries that are considered critical to national security. **Biofuels** fall into that category, Mabus contends, because **they allow the military to diversify its energy supply and become less exposed to volatile oil prices.**

#### The Navy is looking for biofuels now

**Ivey 6/10** (Lt. Richlyn Ivey, Office of the Assistant Secretary of the Navy for Energy, Installations and Environment, sde, 6/10/14, “Department of the Navy Seeks Biofuels on a Large Scale”, http://www.navy.mil/submit/display.asp?story\_id=81565

**In a major step for the Department of the Navy's efforts to increase operational readiness and mission effectiveness by reducing its reliance on petroleum,** at least 37 million gallons of drop-in **tbiofuels are being sough** as part of its F-76 marine diesel and JP-5 shipboard jet fuel supply in the upcoming Inland/East/Gulf Coast bulk fuels solicitation released by the Defense Logistics Agency (DLA) Energy on June 9. Bids are due by July 9, and deliveries of fuel will start April 1, 2015. The Inland/East/Gulf Coast is the single largest bulk fuels acquisition program, and is valued in excess of $3.5 billion.   **The biofuels sought can be blended** in a range of 10 to 50 percent **with conventional petroleum products and must meet all military fuel specification properties** which make handling requirements and performance indiscernible to the end user. Currently, two biofuels pathways have been tested and qualified for use in Navy and Marine Corps aircraft, ships, vehicles and equipment and efforts are underway to adopt more pathways.   DLA will purchase the biofuel blends only if they are cost competitive with their conventionally-derived counterparts. $27.2 million in US Department of Agriculture (USDA) Commodity Credit Corporation (CCC) funds, capped at 71 cents or less per neat biofuel gallon, are available to defray any additional costs that may exist for fuels derived from domestic feedstocks on a USDA-approved list.   **Expanding military energy sources improves the reliability of our overall fuel supply, adds resilience against supply disruptions, and gives the military more fuel options to maintain its readiness and defend the national security interests of the United States**

### ABB is efficient for the navy

**Biofuel production increase efficicieny of navy by decreasing cost and emissions)**

Mike Hower ’14 (Mike Hower is a writer, thinker and strategic communicator that revels in driving the conversation at the intersection of sustainability, tech, politics and law. He studied Political Science and History at the University of California, Davis and has spent time working for the United States Congress in Washington, D.C.; Can the US Navy Turn the Tide with Biofuels?”; Triple Pundit;<http://www.triplepundit.com/2014/01/can-us-navy-turn-tide-biofuels/>; Monday January 13th, 2014) SSH

At the beginning of the 20th century, 16 U.S. battleships — all painted white with gilded bows — set off on an unprecedented two-year voyage around the world. Dispatched by President Theodore Roosevelt as a show of America’s newfound naval might, the “Great White Fleet” ushered in a new era of U.S. involvement in global affairs.  More than a century later in 2009, Secretary of the Navy Ray Mabus announced that the Navy would demonstrate and then deploy a “Great Green Fleet,” a carrier strike group fueled by alternative energy sources. Developing the Great Green Fleet was one of five energy goals set by Mabus to reduce the Department of the Navy’s consumption of energy, decrease its reliance on foreign sources of oil and significantly increase its use of alternative energy. Mabus has also committed to obtaining at least 50 percent of the energy used by the Navy and Marine Corps from alternative sources by 2020.  Ambitious? Yes. Feasible? Definitely.  In 2012, the Navy demonstrated the Great Green Fleet’s potential in the Rim of the Pacific (RIMPAC), the world’s largest international maritime exercise. During these maneuvers, the Navy powered its ships, fighter jets and helicopters with biofuels.  What was the performance cost of running off renewables? Zero. Less than zero, actually, as engines saw a slight performance boost from the cleaner-burning biofuel.  Though the Great Green Fleet’s critics argued the biofuels used during the 2012 RIMPAC were significantly more expensive than petroleum-based fuels, this was only because the Navy ordered a small batch of the specialized fuel. As the Navy has scaled up production of biofuels by investing in specialized refineries, costs have plummeted.  A cornerstone of this effort is the “Farm-to-Fleet” program, part of the USDA-Navy partnership started in 2010, when President Barack Obama challenged his secretaries of Agriculture, Energy and Navy to investigate how they could work together to speed the development of domestic “drop-in” diesel and jet fuel substitutes.  “It’s going to be very competitive with fossil fuels,” Mabus said last week during a discussion at the Commonwealth Club of San Francisco. “In fact, we’re not going to do it unless it is competitive with fossil fuels.”  Mabus explained that going green was not only an environmental sustainability move, but also an economic and military imperative.  As anyone who has ever owned a car knows, the cost of fuel fluctuates every time there is so much as a hint of unrest in the oil-producing regions, such as the Middle East. With a petroleum-dependent fleet, the Navy is often forced to pay millions more than it budgeted when the cost of fuel shoot ups. This means it has less money to spend on operations, training troops and building new ships.  With the federal sequester and other austerity measures strangling military budgets, finding cheaper, more efficient energy sources is more important than ever.  “Now is exactly the time that we have to do this,” Mabus said. “A tightening budget situation makes it even more urgent, even more critical that we do this.  According to Mabus, the Navy has always been on the forefront of new energy technologies, switching from sail to coal, coal to oil, and pioneering nuclear. “Every single time, there were naysayers,” he said. “It’s one of our core competencies: changing energy.”  Investing in green technologies has also helped to save American lives, Mabus said. In Afghanistan, for example, for every 50 convoys sent to the front lines, one marine dies. Since oil is one of the main things these convoys haul, reducing the need for it will decrease the number of convoys needed, which will save lives.  Mabus said climate change and rising sea levels will make it increasingly difficult for the Navy to do its job. With a significant percentage of the world’s population living near oceans, sea level rise can trigger instability.  “Our responsibilities, our jobs, become bigger because of sea level rise,” Mabus said. There is serious concern for island-nations like the Maldives, which could disappear from the face of the Earth if sea levels rise much further.  The Navy often looks to its enlisted men for sustainability ideas, such as how to increase energy efficiency on its ships and land-based facilities. “People who join the Navy or Marine Corps have this willingness to change, and it’s part of the spirit of innovation,” Mabus said.  The Department of Defense is the biggest user of fossil fuels in the world, and the Navy uses about a third of it. With the U.S. having spent around $716 billion on defense in 2013, this isn’t chump change.  “What we do is we bring a market,” Mabus said.

#### ABB’s increase Navy’s efficiency

**Osborn 8-7** (Kris Osborn, 08-07-13 “Lowering Prices on Biofuels Offers Navy Hope” Military.com  http://www.military.com/daily-news/2013/08/07/lowering-prices-on-biofuels-offers-navy-hope.html)**RRM**

**Senior energy officials with the Navy are optimistic about the future of biofuels and alternative fuels** despite Congressional criticism, **saying an emerging market for biofuel production has continued to lower prices. Such developments are in keeping with the service's goal that up to one-half of its energy will come from alternative sources by 2020. In fact, as part of what it calls its "Great Green Fleet" initiative, the Navy plans to deploy a carrier strike group powered by alternative fuel in 2016**, said Tom Hicks, Deputy Assistant Secretary of the Navy, Energy. It had been thought by some observers that realistic production and competitive prices for biofuels could be a decade or more away. However, **progress with an emerging market is exceeding some expectations**, Hicks explained. **"The alternative fuels piece is coming together more quickly** than we had **planned.** Our partnership with the U.S. Department of Energy and U.S. Department of Agriculture is beginning to yield some promising results at this point," Hicks added. The Navy's Great Green Fleet is named after Theodore Roosevelt's famous Great White Fleet, a Navy battle fleet ordered by President Roosevelt to circumnavigate the globe from 1907 to 1909. As part of the Great Green Fleet, an entire USS Nimitz Carrier Group, including both ships and air assets, were successfully powered by a 50-50 blend of biofuels and traditional fuel during last-year's Rim of the Pacific, an international maritime exercise, service officials said. Recognizing that many members of Congress have criticized biofuel efforts on the grounds of cost, Hicks explained that the costs of biofuels are already decreasing as larger quantities become available. "Biofuels will be available by 2016 in meaningful quantities. The market is evolving very rapidly. Economies of scale will drive down the price," Hicks said. However, critics on the Hill have consistently voiced concerns about the price of biofuels. Senator John McCain, R-Ariz., was critical of the Navy's biofuel effort in a letter to Navy Secretary Ray Mabus in August of last year, citing the cost at $26 per gallon. "Your decision to buy 450,000 gallons of biofuels at over $26 per gallon for a 'demonstration' using operations and maintenance funds provided by Congress to equip and train military personnel and operate and repair facilities was not authorized and is a terrible misplacement of priorities," McCain's letter states. In an editorial written this past December, Senator James Inhofe, R-Okla., also raised questions about the value and readiness of biofuels. "When every defense cut degrades our military's readiness, why would we want our Navy to pay four to five times more than necessary for fuel?" he wrote. "With a military budget that continues to decrease, where is the Navy going to get the funds to pay for biofuels?" When asked about these price-related concerns from the Hill, Hicks made reference to four recent contract awards to companies slated to produce up to 170 million gallons of biofuel for under $4 per gallon in 2016. In fact, proponents of the biofuel acquisition effort make a distinction between prices needed to acquire small amounts of biofuels for testing -- and the much lower prices associated with buying larger quantities for future operational use. Hicks, and other proponents of the program emphasize the need to keep prices low and competitive. Overall, **the Navy is optimistic in the prospects for affordable, mass producible quantities of biofuels.** **The Navy uses about 1.3 billion gallons of fuel per year**, Hicks explained, adding that **in the future more fuels could involve a blend of conventional petroleum with "drop-in" alternative fuels such as biofuels, synthetic fuels or other bio-based products such as algae-based fuels.** There are several kinds of alternative fuels, ranging from those emerging from the Fischer-Tropsch process -- a kind of chemical reaction that can convert gas to liquid. This process can produce natural gas, biomass material and energy from municipal solid waste, Hicks explained. "We have a degree of confidence that we could begin utilizing these fuels provided they are cost competitive with petroleum," Hicks said. **At the same time, other materials can come from a family of bio-based products** called Hydroprocessed Esters and Fatty Acids, a category which includes things **like sugar cane or algae.**

#### Navy interested in ABB, prices becoming more accessible

**Daly 2012.** (John Daly, PhD, President and CEO of U.S.-Central Asia Biofuels Ltd, 3-26-2012) “U.S. Military Gets Serious About Biofuels” Oilprice.com<http://oilprice.com/Alternative-Energy/Biofuels/U.S.-Military-gets-Serious-about-Biofuels.html> CRC

**The U**nited **S**tates **Armed Forces, which currently fuels 77 percent of its machinery with petroleum-based fuel, has announced** an aggressive goal, **to be petroleum free by 2040. The Air Force intends to use biofuels for 50 percent of its domestic aviation needs by 2016.** A 2011 Pew Charitable Trusts report, "From Barracks to the Battlefield: Clean Energy Innovation and America's Armed Forces" reported that Department of Defense clean energy investments increased 300 percent between 2006 and 2009 - from $400 million to $1.2 billion - and are projected at $10 billion annually by 2030, adding that that by 2015, the Pentagon will be spending $2.25 billion each year to harness clean energy technologies for air, land and sea vehicles. Driving the Pentagon’s green drive is Executive Order 13423, which mandates that the Department of Defense achieve a 30 percent reduction in non-tactical fleet fossil fuel use by 2020. A second key piece of legislation driving the Pentagon’s mandate is the Renewable Fuel Standard, which Congress enacted in 2005 as part of the Energy Policy Act, amending it in the 2007 Energy Independence and Security Act. The amended standard mandated that by 2022 the consumption volume of the renewable fuels should consist of: 15 billion gallons of conventional biofuels, mainly corn-grain ethanol; 1 billion gallons of biomass-based diesel fuel; 4 billion gallons of advanced renewable biofuels, other than ethanol derived from cornstarch, that achieve a life-cycle greenhouse gas threshold of at least 50 percent; and 16 billion gallons of cellulosic biofuels produced from wood, grasses, or non-edible plant parts, such as corn stalks and wheat straw. The draft AEITF RFP marks the beginning of the AEITF's plan to develop a large, coordinated procurement process for renewables. The AEITF's new program was developed in response to a National Defense Authorization Act that requires Department of Defense facilities to derive at least 25 percent of the electricity they consume from renewable energy by 2025, and a Department of Defense "Net Zero Energy" initiative, which challenges DOD installations to produce more energy than they consume, with emphasis on the use of renewable energy and alternative fuels. So, what is holding back the production of commercially viable amounts of biofuels? Key **barriers to achieving the** renewable fuel **mandate are the high cost of** producing **biofuels** compared with petroleum-based fuels uncertainties in future biofuel markets, a lack of subsidies and crop insurance, along with a shortage of significant investment. These factors have combined to produce a “perfect storm” up to now for biofuel producers, resulting in “designer fuels” of high cost for Pentagon testing. To give but one example. **In October 2010 the Navy purchased 20,055 gallons of algae biofuel at a**n eye-watering **cost of $424/gallon**. Nevertheless, the contract was one of the biggest U.S. purchases of a non-corn ethanol biofuel up to that time. A year later, the Navy reportedly spent $12 million for 450,000 gallons of biofuel. The bad news was that the biofuel’s cost worked out to around $26.67 per gallon, roughly six times the current cost of traditional gas. The good news? **In a single year, the cost per gallon of biofuel plummeted by a factor of 15.9.**

#### ABB meet Navy fuel requirements

**Matsunaga, 2014**. (Mark Matsunaga: U.S. Pacific Fleet Public Affairs, 7-11-2014) “Navy looks to biofuels in 2016” The Lemoore Navy News.<http://www.hanfordsentinel.com/lemoorenavynews/news/abroad/navy-looks-to-biofuels-in/article_cef77ef2-5da8-5430-893a-604db48ecb0b.html> CRC

Simonpietri said **Department of Defense** Alternative Fuel Policy **requires that replacement fuels must** be "drop-in" fuels and meet existing fuel specifications. The biofuels must **utilize existing transportation and distribution infrastructure and require no modifications to weapons platforms.** Moreover, these alternative fuels must be cost-competitive with petroleum fuel and have lifecycle greenhouse gas emissions that are no worse than conventional fuels while also complying with existing procurement, energy, health and safety laws and regulations. **Biofuels can be made from a variety of feedstocks, including** crop residues, woody biomass, dedicated energy crops, vegetable oils, animal fats and **algae**. Simonpietri also made the important point that biofuel production must complement rather than compete with food crops. The "drop-in biofuel" the Defense Department wants is not the same as the familiar ethanol and biodiesel -- first- and second-generation biofuels -- that are used in cars and trucks. What **the Defense Department is pursuing is third-generation biofuel "drop-in" replacements for diesel and jet fuels that are used in aircraft and ships.** These biofuels are much more advanced, have far less oxygen than ethanol and biodiesel, and contain the same energy density as their petroleum-based counterparts. Chris Tindal, director for operational energy in the Office of the Deputy Assistant Secretary of the Navy for Energy, said that **in** RIMPAC **2012 the Navy successfully demonstrated the Great Green Fleet,** operating a carrier strike group's surface ships and aircraft with a biofuel blend without incident. In fact, **the** Great Green Fleet 2012 **demonstration was a significant milestone of the Navy's testing and certification program for "drop-in" biofuels derived** from used cooking oils and **algae**.

### Navy K 2 solve china war

#### US Naval capabilities key to solving South China Sea conflict if costs are kept down

**Carlo Muñoz 5/ 22** (Political analyst for USNI News; “Navy ‘Starting to Shape Events’ in volatile South China Sea”; <http://news.usni.org/2014/05/19/greenert-navy-starting-shape-events-volatile-south-china-sea>; USNI NEWS; May 22, 2014) SSH

**The sea service’s expanding presence in the Asia-Pacific is already starting to pay dividends in tamping down tensions between China and U.S allies in the region,** the Navy’s top officer said Monday.  “It is going to be a long-term effort . . . [but] **we are seeing results” of America’s growing maritime footprint in the Pacific,** Chief of Naval Operations Adm. Jonathan Greenert said in a speech at the Center for Strategic and International Studies in Washington, D.C.  “We are starting to shape events” in the region, in the wake of recent Chinese military aggression in areas like the South China Sea, Greenert said.  During Wednesday’s speech, Greenert cited several examples of senior commanders with the People’s Liberation Navy (PLAN) intervening on behalf of U.S. warships to diffuse potentially dangerous confrontations with Chinese military and civilian vessels.  **The Navy chief credited attributed those small successes to the White House’s commitment to the Pentagon’s plan to shift focus from the wars in Iraq and Afghanistan to potential hot spots in Asia.**  “We have to manage our way through this” he said regarding the long-term nature of Washington’s strategic shift to the Pacific and the ongoing Chinese response.  “We are on a good course . . . and we are going to have to [continue to] lead” that effort in Asia, according to the CNO. That said, Greenert was adamant that recent **flare-ups between Beijing and U.S. allies in the region would not throw Navy and Pentagon leaders off that course.**  “We are not leaving and [the Chinese] know that,” he added.  But simmering conflicts over China’s movements in the Asia-Pacific, most recently against The Philippines and Vietnam, are prompting U.S. military leaders to re-examine standing military-to-military agreements between Washington and its allies, Greenert said.  “We exercise and interoperate . . . reasonably good” with Manila, Hanoi and other regional powers already, the CNO said. But as Chinese aggression continues to threaten stability in the Pacific, Greenert suggested it may be time to re-draft standing status of forces agreements (SOFAs) with the Philippines, Vietnam and others to address Beijing’s actions.  “**I am waiting to see what we could do more of” in terms of military-to-military cooperation with Pacific allies**, he said.  Navy leaders are also exploring options as to what U.S. allies in the Pacific could do to back American-led efforts in the region,given the fiscal difficulties the Pentagon is facing stateside, according to Greenert.  “**There are fiscal realities that are going to affect” the Asia-Pacific strategy, the CNO said, “and that is going to result in us depending more” on US allies in the region**.  He declined to go into details regarding what more U.S. forces or their allies could do in the years ahead, but Greenert’s comments come less than a month after the White House finalized a landmark defense pact with the Philippines, which will re-open key military bases to U.S. forces for the first time since the 1990s.

#### Impact of an effective navy on defense from World (Nuclear) Threats

(Without Sufficient Funding, The Navy is At Risk, Algae helps lower fueling costs)

#### 1) LaGrone 7-9(Sam LaGrone, USNI press, 7-9-14, USNI, “Navy Leaders: Dept. of Energy Budget Cuts Threaten Navy’s Nuclear Fleet”)

#### The Navy’s top leaders claim ongoing the Department of Energy’s budget cuts are putting, “the nation’s security at risk,” in a Monday letter to Congress. The letter — signed by Chief of Naval Operations Adm. Jonathan Greenert and head of Naval Reactors Adm. John Richardson — warn continued cuts to National Nuclear Security Administration’s (NNSA) naval reactors program could have a dramatic affect on the service’s nuclear fleet. Over the last four years, the NNSA has seen its budget for naval reactors drop almost $450 million. A planned cut of $162 million in the NNSA’s Fiscal Year 2015 budget would bring the total to $600 million, Greenert and Richardson wrote. “This approach is no longer sustainable,” read the letter sent to the members of Senate and House appropriations, energy and defense committees. “The persistent cuts have put [Naval Reactors] in the position of being unable to provide for a safe and reliable nuclear fleet, design and test the reactor plant for the Ohio Replacement Program [ORP] and safely and responsibly manage aging infrastructure and the facilities for processing naval spent nuclear fuel.” The reactors powering the service’s fleet of aircraft carriers and submarines are provided to Naval Reactors by the NNSA and are in turn operated by the Navy. The budget line for Naval Reactors is $1.2 billion in the FY 2015 NNSA submission. Elaborating on Greenert’s position, Navy spokesman Capt. Danny Hernandez told USNI News on Wednesday said the fleet would be able to operate the existing reactors safely but would have problems in the future. “We can’t manage it,” he said. “We can’t sustain fleet support and new programs if there are further cuts.” The cuts come as some in Congress have started to ask hard questions about the Naval Reactors program and why the office’s budget requests have been on the rise. According to a June report from the House Appropriations Committee (HAC) — reported by Defense News — the committee “remains concerned about the high year-to-year increases that NR is using for its programmatic planning basis in future years.” Sustained growth in the reactors line is, “an unlikely scenario considering the current fiscal environment,” read the HAC report. The HAC asked Naval Reactors to submit a report on how funding below the five-year projected funding stream would affect the reactors program. The highest profile project emerging from the office will be the design of the new nuclear reactor for the 12 Ohio replacement ballistic missile submarines (SSBN) the service will start to buy in 2021. The reactors are required to last the life of the boomers without needing to be refueled and will drive a new electric ship design.

#### 2) MINNICK 6-2(Wendell Minnick 6-2-14, Defense News, “Report: Chinese Cruise Missiles Could Pose Biggest Threat to US Carriers”)

TAIPEI — **Saturation strikes from Chinese anti-ship cruise missiles could become the biggest threat to US Navy carrier strike groups** (CSG), according to a paper issued by the Center for the Study of Chinese Military Affairs at the National Defense University.

The paper , “A Low-Visibility Force Multiplier: Assessing China’s Cruise Missile Ambitions,” draws from both Western and Chinese-language open source documents and concludes, “experienced Aegis warriors will respect China’s emerging capabilities.”

Written by cruise missile specialist Dennis Gormley, and China military specialists Andrew Erickson and Jingdong Yuan, the paper states that, **due to the low cost of developing, deploying and maintaining cruise missiles, the Chinese believe that cruise missiles possess a 9:1 cost advantage over the expense of defending against them.** China assumes that “quantity can defeat quality” by simply saturating a CSG with a variety of high-speed, low-altitude, cruise missiles.

The common belief in US Navy circles that China would “need to approach parity in deck aviation capabilities” to defeat a CSG “may no longer be valid.”

**China has “clearly” elevated cruise missile development “over an organic carrier capability with the apparent goal of acquiring the capability to neutralize US carrier strike group forces through overwhelming” cruise missile attacks.**

The paper also delves into a darker future that includes nuclear-armed cruise missiles. Noting that the former Soviet Navy emphasized the employment of nuclear-armed cruise missiles against a CSG, the paper suggests the possibility the Chinese Navy might pursue the same option in the future. The argument against China pursuing this capability is its weakness in command and control and the fact that such a capability would be “inconsistent with [China’s] current nuclear doctrine.”

The possibility, according to the paper, cannot be ruled out. Quoting retired US Navy Rear Adm. Michael McDevitt, China is “likely already ‘arm[ing] nuclear attack submarines with nuclear-tipped cruise missiles.’” The paper’s authors could find no evidence of “substrategic nuclear weapons,” but the “Soviet Navy has clearly influenced” the thinking of the Chinese Navy.

The paper looks at the publications of Senior Capt. Liu Yang, a Chinese naval officer at the Wuhan Office of the Naval Armaments Department. Liu’s writings suggest that “all options are on the table” for the “special anti-aircraft carrier mission.”

Liu outlines three courses of actions, such as a cruise missile armed with a low-weight nuclear burst warhead, a fuel-air explosive warhead, and an undefined “special type of warhead with even greater power to inflict casualties.”

The fact that Liu is associated with the Wuhan Office suggests his writings should be “under serious consideration and may even have moved beyond the theoretical stage.” However, Beijing’s history of centralized control of nuclear weapons argues against allowing deployment of sea-based nuclear-armed cruise missiles.

## Aviation

### Airlines want biofuels

#### Airlines want to use biofuels

**Hurst 11 (Timothy, Executive editor of Earth & Industry, sde, 11/7/11, “Airlines Set For First Biofuel- Powered Commercial Flights in the US”, http://earthandindustry.com/2011/11/airlines-set-for-first-biofuel-powered-commercial-flights-in-u-s/**

Although Alaska Airlines seems to have been edged out by United in the race to be the first commercial airline in the U.S. to use biofuel, the scale of their achievement still bests that of United:  Alaska's flight on Wednesday will be the first of 75 regularly scheduled biofuel-powered commercial flights in the United States. In other words, Alaska's effort is more than a demonstration**. It is an effort to make biofuels a regular part of the fuel mix.  "[S]ustainable biofuels are key to aviation’s future,”** Alaska Air Group Chairman and CEO Bill Ayer said. **"They will enable us to fly cleaner, foster job growth in a new industry, and can insulate airlines from the volatile price swings of conventional fuel to help make air travel more economical,"** said Ayer.  Both the United and Alaska flights will be made on Boeing aircraf**t.  “Aviation clearly needs a clean energy alternative to fossil fuels,”** said Boeing Commercial Airplanes Vice President of Environment and Aviation Policy Billy Glover**. “In the U.S.** and around the world, **the industry is doing all it can to support sustainable biofuel development and maintain aviation’s role in global economic growth"**  Glover called on the government to enact supportive policies "that encourage investment in the early stages of this emerging secto**r.”  Alaska and United join a growing list of commercial airlines and biofuel companies vying to become the first companies to utilize aviation biofuels at a large, sustained scale**

### Biofuels trade off

#### Biofuels trade off with current jet fuels in Aviation Industry

**By Frances Cha ‘14**

(CNN writer specializing in technology;<http://www.cnn.com/2014/01/23/travel/boeing-biofuel/> ; Desert plants and green diesel: Meet the jet fuels of the future; CNN; January 23, 2014; Sub-point: Diversification) SSH

Diversification Why so many types of biofuel? For aviation companies, **it's important to diversify the types of crops for biofuel** production, as well as the locations where the crops are grown. **This reduces exposure to the fuel cost volatility that comes from relying on a single source of energy**. Similar to the supply chain announced by **Boeing,** Airbus has established six regional alternative fuel "value chains" in Australia, Brazil, the Middle East, Romania, China and Spain, **and is looking at feedstocks such as algae** and cooking oil. **The industry's pressures** and incentives **to reduce carbon dioxide emissions are enormous**. The current aggressive target is carbon neutral growth from 2020 and a 50% reduction in carbon dioxide emissions by 2050, based on 2005 levels, according to both manufacturers and the International Air Transport Association (IATA). According to IATA**, air transport produced 689 million tons of carbon dioxide, approximately 2% of the global total**, in 2012. Green diesel "Our industry still faces two issues: there isn't enough aviation biofuel to meet airline demand, and we need to bring the cost down to parity with petroleum jet fuel," says Jessica Kowal of Boeing's environment communications team. For Boeing, green diesel is one of most compelling of the many biofuel "pathways" -- but not because it's considered to be better than other sources in terms of carbon emissions. Feedstocks **Boeing is researching for biofuel include** waste cooking oil, leftover corn stalks, leftover wood products, sugarcane**, algae,** camelina, jatropha and municipal solid waste. Instead, green diesel's distinguishing factor is that it's already made in bulk, with a global production capacity of 800 million gallons. While that's far from meeting the total global aviation jet fuel demand of 60 billion gallons per year**, the capacity to quickly address 1% of it (600 million gallons) is worth chasing. *Boeing is currently seeking approval from regulators around the world to use it as jet fuel, blended with petroleum*,** beginning this year. Despite being made from the same sources of vegetable oils and animal fats, green diesel is not to be confused with biodiesel, as the latter produces different types of molecules during processing and cannot be used as jet fuel. Price is another big reason this new biofuel is a frontrunner ***-- with government incentives, it costs approximately $3 a gallon -- a competitive alternative to fossil jet fuel*.** Since aviation biofuel was approved for use in 2011, more than 1,500 commercial flights have been powered by a blend of traditional fuel and biofuels.

#### Aviation industry needs sufficient trade-off with biofuels

**Rhiannon Meyers 7/15** (Writer for Fuel Fix in the Biofuels category; http://fuelfix.com/blog/2014/07/15/report-demand-for-biofuels-expanding-rapidly-in-aviation-marine-industries/ ; “Biofuels demand up for aviation, marine industries”; Fuel Fix; July 15, 2014)SSH

**Demand for biofuels in the aviation and marine industries has expanded rapidly** in recent years, representing **one of the fastest-growing segments of** the global **biofuels market**, according to projections from market research firm Navigant Research**.  Biofuels will make up 6.1 percent of the aviation** and fuel market in the U.S by 2024, the firm estimated. At the same time, global production capacity is expected to reach 3.3 billion gallons, or 1.5 percent of total marine and aviation consumption, the report noted.  **The growth in biofuels comes as nations look for solutions to combat rising fuel costs and try to comply with emerging emissions regulations**. In the last five years, biofuels, in part, powered 600,000 miles of flight among more than 40 commercial airlines, the report noted.  But constraints with the raw materials used to produce biofuels combined with the high cost to invest in biofuel technology could dampen growth, the report noted.  **Overall, the United States is expected to lead the construction of refineries capable of producing bio-based jet and marine fuel, with new construction expected to generate $7.8 billion in revenue over the next 10 years**.  The European Union also is expected to play a large role in the emerging market, but forecasting their growth is trickier, hinging in large part on whether a carbon tax is implemented on airlines operating in EU territory. If that happens, production capacity would increase dramatically.

### Biodiesel good for aviation

#### ABB best option for future aviation fuels

**Daggett et al, 2007.** (David L. Daggett, Boeing Commercial Airplane, Robert C. Hendricks, NASA Glenn Research Center, Rainer Walther, MTU Aero Engines, Edwin Corporan Air Force Research Laboratory, 2007) “Alternate Fuels for use in Commercial Aircraft” The Boeing Company.<http://cafefoundation.org/v2/pdf_tech/MPG.engines/PAV.Biofuel.Boeing.Study.2007.pdf> CRC

The mid-term options, including future **renewable** derived **bio-fuels** and its blends with synthetic fuels, offer the **promise** of **a complete replacement for crude oil derived fuels**. In addition, for at least the CO2- emissions from the bio-derived fuel fraction, it offers the chance for an atmospheric neutral CO2 balance fuel. **Algae seem to be a promising future** feedstock **option** which could provide a much higher oil yield per hectare than present bio-fuels. **As such, it is presently the most attractive** lipid-based **biofuel** feedstock **to pursue for aviation**. Other feedstocks, such as switchgrass, may provide the feedstock needed to produce cellulosic ethanol that could be efficiently and easily used in ground transportation,

**(Aff) Biofuels key to future of commercial aviation**

**Lawrence Nussbaum ‘13** (Marketing Specialist, SCS Global Services; “Certified sustainable biofuels key to aviation’s future: SCS Global Services Certifies Companies that Create Fuels from Waste Gases and Renewable Seed Crops Emeryville, CA – December 4, 2013  ”; http://aviationbenefits.org/newswire/2013/12/certified-sustainable-biofuels-key-to-aviation%E2%80%99s-future/; December 06, 2013) SSH

SCS Global Services (SCS), a world leader in third-party environmental and sustainability certification, auditing, testing, and standards development, today announced the successful certification of two companies utilizing biofuel-based technologies designed to advance the aviation industry beyond its dependency on conventional fossil fuels.  The certifications, based on standards set by the Roundtable of Sustainable Biomaterials (RSB), were issued to:   - Beijing Shougang LanzaTech New Energy Science & Technology Co., Ltd., which earned sustainability certification for the conversion of waste steel mill gases to sustainable biofuels at the joint venture’s facility in China.   - PGF Biofuels, which received certification for the production of carinata, an oilseed crop ideally suited for use as a cleaner, lower-carbon fuel  “LanzaTech’s capture and fermentation of waste gases, and PGF Biofuel’s sustainable production and harvesting of oilseed crops, *each provide a glimpse of the future of aviation* fueling,” said Stowe Beam, Managing Director of Environmental Certification Services at SCS. ““SCS Global Services is pleased to play a role in verifying pathways leading us away from fossil fuels toward more efficient and renewable sources to meet tomorrow’s global energy needs.”  The RSB is an international multi-stakeholder initiative that brings together farmers, companies, non-governmental organizations (NGOs ), experts, governments, and inter-governmental agencies concerned with ensuring the sustainability of biomass and biomaterial production and processing. The RSB standard, which encompasses a broad range of environmental, social and economic principles and criteria, has been rated the top sustainability standard for biofuels by the World Wildlife Fund.  SCS is accredited by the RSB to conduct third-party assessments of biofuel operations. It deploys interdisciplinary teams of natural resource specialists and other experts to collect and analyze written materials, conduct interviews with participating operator’s staff and key stakeholders, and complete field and office audits of the operations. Upon completion of this fact-finding phase, the team determines compliance to the RSB principles and criteria. Qualifying companies are authorized to use the RSB logo along with the SCS Kingfisher certification mark.  LanzaTech uses a novel biological approach to transform carbon rich waste gases and residues from industry into fuels and chemicals. LanzaTech’s proprietary gas fermentation technology has no impact on food or land resources.

### Aviation needs trade off

#### Aviation industry needs sufficient trade-off with biofuels

**Rhiannon Meyers 7/15** (Writer for Fuel Fix in the Biofuels category; http://fuelfix.com/blog/2014/07/15/report-demand-for-biofuels-expanding-rapidly-in-aviation-marine-industries/ ; “Biofuels demand up for aviation, marine industries”; Fuel Fix; July 15, 2014)SSH **Demand for biofuels in the aviation and marine industries has expanded rapidly** in recent years, representing **one of the fastest-growing segments of** the global **biofuels market**, according to projections from market research firm Navigant Research**.  Biofuels will make up 6.1 percent of the aviation** and fuel market in the U.S by 2024, the firm estimated. At the same time, global production capacity is expected to reach 3.3 billion gallons, or 1.5 percent of total marine and aviation consumption, the report noted.  **The growth in biofuels comes as nations look for solutions to combat rising fuel costs and try to comply with emerging emissions regulations**. In the last five years, biofuels, in part, powered 600,000 miles of flight among more than 40 commercial airlines, the report noted.  But constraints with the raw materials used to produce biofuels combined with the high cost to invest in biofuel technology could dampen growth, the report noted.  **Overall, the United States is expected to lead the construction of refineries capable of producing bio-based jet and marine fuel, with new construction expected to generate $7.8 billion in revenue over the next 10 years**.  The European Union also is expected to play a large role in the emerging market, but forecasting their growth is trickier, hinging in large part on whether a carbon tax is implemented on airlines operating in EU territory. If that happens, production capacity would increase dramatically.

## Biodiesel

### Biodiesel = Viable Alternative

**Biofuels are being pursued by the military and commercial aviation/ marine industry but high investment is needed**

**Advanced Biofuels USA 7/18** (Org. dedicated to decreasing energy demand and mitigating climate change; Advanced Drop-In Biofuels for Commercial Aviation, Marine Shipping, and Military Applications: Global Market Analysis and Forecasts<http://advancedbiofuelsusa.info/advanced-drop-in-biofuels-for-commercial-aviation-marine-shipping-and-military-applications-global-market-analysis-and-forecasts>; July 18, 2014) SSH

#### Viewed as a game changer in the race to commercialize advanced biofuels, aviation and marine biofuels represent a very significant opportunity for emerging producers in the advanced biofuels industry. Demand for advanced biofuels produced from sustainable, non-food feedstocks is largely driven by a need to hedge against increases in fuel costs, compliance with emerging emissions regulations, and certification of advanced biofuels pathways. Lacking a viable alternative to liquid fuels, aircraft manufacturers, turbine engine manufacturers, and commercial airlines have partnered in flying more than 600,000 miles powered by biofuels since 2008. Additional concerns around energy security and combat readiness has led to a *deepening interest within the U.S. military.*  Although the emerging aviation and marine biofuels market has expanded rapidly in recent years, feedstock constraints *and high capital investment requirements will need to be overcome* for the industry to meet aspirational growth targets. Led by North America, installed nameplate production capacity is expected to reach 3.3 billion gallons by 2024, representing 1.5% of total aviation and marine fuel consumption. Navigant Research forecasts that a cumulative total of 18.2 billion gallons to 19.6 billion gallons of renewable drop-in aviation and marine biofuels could be produced between 2014 and 2024, dependent on the two refinery scenarios analyzed in the report

#### Biodiesel viable alternative to diesel

**Murillo et al, 2006**. (S. Murillo, J.L. Míguez, J. Porteiro, , E. Granada, J.C. Morán: E.T.S. Industrial Engineers, Vigo University (Spain), 11-31-2006) “Performance and exhaust emissions in the use of biodiesel in outboard diesel engines” Fuel.<http://www.sciencedirect.com/science/article/pii/S0016236106004753> CRC

**Results revealed that the use of biodiesel resulted in lower emissions of CO (up to 12%)** with an increase in emissions of NOx (up to 20%, except in one case which presented a slight reduction). Biodiesel also presented a slight increase in specific fuel consumption (lower than 11.4%) which may be acceptable considering the reduction in exhaust emissions. **The experimental results proved that biodiesel alone or blended biodiesel can be used in compression ignition outboard engines, thereby providing a viable alternative to diesel.** Special attention should be paid to the use of biodiesel in boats operating on lakes and rivers and in sheltered bays, which are more vulnerable to pollution.

#### Biodiesel can be used w/o major alterations to the engine

**Murillo et al, 2006**. (S. Murillo, J.L. Míguez, J. Porteiro, , E. Granada, J.C. Morán: E.T.S. Industrial Engineers, Vigo University (Spain), 11-31-2006) “Performance and exhaust emissions in the use of biodiesel in outboard diesel engines” Fuel.<http://www.sciencedirect.com/science/article/pii/S0016236106004753> CRC

**A** four-stroke diesel outboard **engine running on conventional diesel, conventional diesel blended with certain amounts of biodiesel** (10%, 30% and 50%), **and pure biodiesel has been tested and proved to be an environmental friendly alternative to conventional fuels**. A small reduction of power of less than 5% has been observed for BD-10 and BD-30, with this reduction approaching 8% in the cases of BD-50 and BD-100. It has been extensively reported that **the use of biodiesel reduces CO emissions**. In this paper, CO emissions were reduced by the use of biodiesel **between 3% and 10%,** which is below much of the data published by other references. It has been pointed out that biodiesel impact on emissions varies depending on the type of biodiesel (sunflower, soybean, rapeseed, animal fats…) and on the type of conventional diesel to which the biodiesel is added [27]. This, added to the fact that engine operating conditions and precise features also have a strong influence on the impact of biodiesel, makes each study very specific. Emissions of NOx appear to increase with increasing biodiesel concentration in the blend. Indeed, emissions of pure biodiesel are 16% higher than conventional diesel. These values are consistent with the data published by other researchers [23], [24], [25], [26] and [27]. It is known that certain aspects of the engine can be corrected to reduce NOx emissions; however this possibility has not been explored in this paper. This paper has shown that the **biodiesel can be used blended with conventional diesel or even alone as a fuel** in marine outboard engines **without major modifications to the engine**, revealing that the increases in NOx emissions are tolerable given the other benefits implied in the use of biodiesel. The use of a renewable fuel is particularly attractive from an environmental perspective. The use of biodiesel as partial diesel substitute can also help from a social standpoint, as it can boost the agricultural economy and reduce uncertainty on fuel sources.

#### ABB are a viable fuel replacement- we’ve done it before

**Sherin and Norman, 2012**. (Jeff Sherin: MBA, Eric Norman: MBA, Summer 2012) “Is Algae Fuel a Viable Alternative to Petroleum?” Rady UC San Diego School of Management.<http://rady.ucsd.edu/rbj/2012/algae-fuel/> CRC

Gas prices as high as $4.60 per gallon have driven U.S. drivers mad, inspiring consumers to wonder if there might be an easy-to-use, economical alternative to fuel. Could the answer lie in a simple marine plant that is abundant, cheap and carbon neutral, algae? **In 2011, both a Navy** F/A-18 **fighter jet and a Continental Airlines** Boeing 737-800 **aircraft flew using biofuel made from algal oil mixed with standard jet fuel.** The History of Algae as a Fuel Major investment in the conversion of algae to biofuels began in 1978 with the creation of the Aquatic Species Program. The main impetus for the program was a response to the oil shocks of the 1970s and the United States' subsequent push to reduce dependence on foreign oil. The program continued despite the decreasing price of oil in the early 1980s, but was canceled in 1996, largely based on the conclusion that algae production was too expensive in comparison to the cost of oil. As the price of oil climbed in the early part of the 21st century, billions of dollars poured into private-sector algae companies. San Diego, California, attracted a significant portion of this investment, leveraging its moderate climate and research base at the University of California, San Diego to attract new companies such as Sapphire Energy and Synthetic Genomics, along with more established firms such as General Atomics. But while **the industry as a whole has continued to innovate while reducing costs,** no company has yet achieved commercial-scale production of algal transportation fuel. There have, however, been some smaller successes, **such as Solazyme's 2010 delivery of 20,000 gallons of algae-derived shipboard fuel to the U.S. Navy.** What is not known, though, is the cost of the algal fuel. If algae is to compete, it must do so against the production cost of oil, which has a 100-year head start as far as technology and distribution are concerned. Algae's Advantages Deriving oil from **algae has many advantages over other biofuels** such as corn and sugar-based ethanol. For one thing, algae is not directly involved in our food chain**. It** also **grows much faster, utilizes a higher percentage of** the sun's energy than corn or sugar (approximately 3 percent vs. 1 percent), can grow in wastewater **and is capable of producing oil with a higher energy content than ethanol.** Research has focused on three main strategies to grow algae. The first two (raceway and photobioreactors) rely on photosynthesis, converting CO2 and sunlight to oil, while the third utilizes fermentation, which requires feedstock such as sugar cane.

### Biofuels Good for the Environment

#### Biodiesel is good for the environment

**B**iodiesel **A**mericas **A**dvanced **B**iofuel**, No Date**

(Biodiesel Americas Advanced Biofuel, No date, “Biodiesel Basics”, sde, Date accessed: 7/21/14 http://www.americasadvancedbiofuel.com/basics.php

**Biodiesel reduces our dependence on imported fuels that keep jobs and profits overseas,** often in turbulent parts of the world. **This strengthens our energy security while also creating jobs and improving local economies.** Additionally**, Biodiesel diversifies our transportation energy supplies, making us less dependent on oil and less vulnerable to volatile global oil markets.** Biodiesel is better for the environment because it is made from renewable resources such as soybean oil and recycled cooking oil. According to the EPA, **Biodiesel reduces greenhouse gas emissions by 57 percent to 86 percent.** It also has lower tailpipe emissions compared to petroleum diesel. **It is less toxic than table salt, and biodegrades as fast as sugar.**

#### Algae Biofuel has been blended before and was better for the environment

**E360 Digest 12**

**(Yale Environment 360, Yale School of Forestry and Environmental Studies, 11/14/12, sde, Algal Biofuel Blend Reaches the Market At California Gas Station)**

**A U.S. company** this week **began pumping a mix of an algae-based biofuel and gasoline at gas stations in California**, a pilot project the company hopes will be a first step in providing a large-scale alternative to fossil fuels. The fuel, known as **Biodiesel** B20, **contains 80 percent petroleum and 20 percent algae** grown by San Francisco-based Solazyme. The fuel is produced in a fermentation process at Solazyme’s Illinois plant that combines sugar with an organism company officials will not identify. According to the company**, the new fuel blend produces 30 percent fewer particulates, 20 percent less carbon monoxide, and 10 percent fewer hydrocarbons than other biodiesel fuels.** So far, the fuel is being sold for diesel vehicles at four gas stations in the Bay Area for $4.25 per gallon, which is also the average price right now for diesel fuel in California. But Propel Fuels, which is providing the infrastructure for the fuel delivery, hopes to make the fuel available at hundreds of California stations, said Matt Horton, Propel’s CEO. “Our task is to drive awareness,” he said. “When consumers know it is available, that it is priced right and it reduces carbon emissions, they will use it.”

### Biofuels make aircraft stronger

#### Biofuels make aircraft stronger

**Lane, 2014**. (Jim Lane: Author at Biofuels Digest, 4-13-2014) “Can warplanes fly farther, carry more weapons, with advanced biofuels? More new data.” Biofuels Digest.<http://www.biofuelsdigest.com/bdigest/2014/04/13/can-warplanes-fly-farther-carry-more-weapons-with-advanced-biofuels-more-new-data/> CRC

**In California, a group of researchers** from the Naval Air Warfare Center Weapons Division at China Lake **have confirmed that “high density fuels with net heats of** combustion ranging from 133–141 000 Btu gal[1], or **up to 13% higher than commercial jet fuel could be generated***”* from biosynthetic materials. What does 13 percent mean? **That means carrying 13 percent less fuel for a standard mission, or traveling 13 percent farther with a full fuel load.**Considering that the F18-E carries around 14,400 pounds of fuel and an F18-F carries around 13,500 *—* **that’s enough to add an extra Harpoon or SLAM missile** (based on weight*).***Or, extend the range of an F/A 18 Super Hornet from 2069 miles to 2337 miles, or extend mission time accordingly.** That’s just on the fuel density. But wait, there’s more. Longer engine life, less metal fatigue Last May, the Digest reported that tests conducted at Wright-Patterson Air Force Base have revealed that **renewable fuels were lowering US warplane engine temperatures by 135 degrees,** owing to absence of impurities found in conventional fossil fuels. These were SPK fuels. The ones that are under investigation at China Lake are even more dense, more attractive. But the performance of these new, biosynthetic fuels could be expected to share one important characteristic with SPK fuels. The lack of the impurities that are found in petroleum-based fuels. Why do impurities matter? When those impurities burn, he explained, it causes high temperatures to radiate throughout the engine, causing an acceleration in metal fatigue. “At the temperatures that military jet engine perform at, an additional 25 degrees in temperature can shorten the life of the engine by half,” Mendoza said. He added that the **preliminary data showed that engine parts could last up to 10 times longer, if the new high performance fuels were employed in place of conventional fossil fuels*.*** Moreover, the impurities can cause the fuel exhaust to “spray”, reducing the direct thrust from an engine. The same way that, if a wind changes directions, you either have to tack a sailboat or suffer a loss in speed. Or why a concentrated “jet stream” of water from a hose exerts more pressure than a stream set in “spray” mode. All of which causes **renewable fuels,** which have reduced tendency to “spray”, **can create increased thrust with comparable fuel density.**

### CO2 emissions contribute to GW

**Aviation industry needs sufficient trade-off with biofuels**

**Rhiannon Meyers 7/15** (Writer for Fuel Fix in the Biofuels category; http://fuelfix.com/blog/2014/07/15/report-demand-for-biofuels-expanding-rapidly-in-aviation-marine-industries/ ; “Biofuels demand up for aviation, marine industries”; Fuel Fix; July 15, 2014)SSH

**Demand for biofuels in the aviation and marine industries has expanded rapidly** in recent years, representing **one of the fastest-growing segments of** the global **biofuels market**, according to projections from market research firm Navigant Research.  **Biofuels will make up 6.1 percent of the aviation** and fuel market in the U.S by 2024, the firm estimated. At the same time, global production capacity is expected to reach 3.3 billion gallons, or 1.5 percent of total marine and aviation consumption, the report noted.  **The growth in biofuels comes as nations look for solutions to combat rising fuel costs and try to comply with emerging emissions regulations. In** the last five years, biofuels, in part, powered 600,000 miles of flight among more than 40 commercial airlines, the report noted.  But constraints with the raw materials used to produce biofuels combined with the high cost to invest in biofuel technology could dampen growth, the report noted.  **Overall, the United States is expected to lead the construction of refineries capable of producing bio-based jet and marine fuel, with new construction expected to generate $7.8 billion in revenue over the next 10 years**.  The European Union also is expected to play a large role in the emerging market, but forecasting their growth is trickier, hinging in large part on whether a carbon tax is implemented on airlines operating in EU territory. If that happens, production capacity would increase dramatically.

#### CO2 Emissions and contrails are a major contributor to global warming

**Braconnier ’11**

(Deborah Braconnie is a writer for Phys.org; “Airplane contrails worse than CO2 emissions for global warming: study ;<http://phys.org/news/2011-03-airplane-contrails-worse-co2-emissions.html>; Mar 31, 201) SSH

PhysOrg.com)

In a recent study published in Nature Climate Change, Dr. Ulrike Burkhardt and Dr. Bernd Karcher from the Institute for Atmospheric Physics at the German Aerospace Centre show **that the contrails created by airplanes are contributing more to global warming that all the CO2 that has been caused by the entire 108 years of airplane flight.** Airplane contrails are the white clouds that we see in the sky spreading behind jets. These cirrus clouds are created when the hot, moist air released from the plane freezes in the colder and drier air**. These clouds then trap the long-wave radiation from Earth and create a warming of the atmosphere.** In their study, Burkhardt and Karchar utilized satellite imagery of these spreading contrails to create a computer model which estimates how the contrails affect the Earth’s temperature. They **have discovered that aviation contrails play a huge role in the impact on the climate and an even greater impact than that created by the CO2 emissions produced. While the CO2 emissions from airplanes account for around three percent of the annual CO2 emissions** from all fossil fuels and change the radiation by 28 milliwatts per square meter, the aviation contrails are responsible for a change of around 31 milliwatts per square meter. The only difference is that CO2 has a longer life than that of the contrails, and can still continue to cause warming even hundreds of years down the road**. The researchers believe that while continuing to reduce CO2 emissions in aviation, more work needs to be done to reduce contrails as well. *This reduction of contrails could present an immediate effect on global warming.***Solutions for this could include such things as creating flight plans at lower altitudes and the development of new airplane engines which would either reduce the water vapor released or immediately condense the water into ice that would drop

### Biofuels impact the economy

#### Biofuels have a huge impact on the economy- card formatting is weird on this for some reason

## BIO ’09 (Organization based on increasing biotechnology; “Standard (RFS) for transportation fuels sets minimum levels of renewable fuels that must be blended into gasoline and other transportation fuels from 2006 to 2022”.<http://www.bio.org/articles/us-economic-impact-advanced-biofuels-production-1> February 25, (Biotechnology Industry Organization), M/S

## To estimate the economic implications of the emergence of this new industry, bio-era conducted a meta-analysis of nearly two dozen studies of economic impacts of biofuels production, developed model to analyze the economic impact of increasing U.S. AB production to 21 billion gallons per year by 2022. This analysis yielded the following conclusions: Direct job creation from advanced biofuels production could reach 29,000 by 2012, rising to 94,000 by 2016 and 190,000 by 2022. Total job creation, accounting for economic multiplier effects, could reach 123,000 in 2012, 383,000 in 2016, and 807,000 by 2022. Advanced biofuels production under the RFS scenario could reduce U.S. petroleum imports by approximately $5.5 billion in 2012, $23 billion in 2016, and nearly $70 billion by 2022. The cumulative total of avoided petroleum imports over the period 2010–2022 would exceed $350 billion. Bio-era model was used to assess economic implications of scenario which total U.S. biofuels production grows to 60 billion gallons by 2030, with 15 billion gallons of conventional biofuels This analysis concludes that: Approximately 400,000 jobs would be directly created in the advanced biofuels industry, with total employment creation in the U.S. economy totaling 1.9 million jobs. Direct economic output from advanced biofuels production would rise to $113 billion by 2030. The total economic output effect would be $300 billion. Biomass feedstock’s in this scenario could be provided by a mix of agricultural and forest wastes and dedicated energy crops, providing a total of 470 million dry tons of biomass by 2030 using existing crop and forest land. The average cost of AB production at the plant-gate in 2030 would be $1.88 including all operating costs, overhead, and capital recovery.

## Neg- Navy

**Military will not benefit from biofuels**

**Maron, 2011. (**DINA FINE MARON: Writer for ClimateWire, 1-25-2011) “Biofuels of No Benefit to Military – RAND” The New York Times.<http://www.nytimes.com/cwire/2011/01/25/25climatewire-biofuels-of-no-benefit-to-military-rand-11643.html> CRC

**Fuels made from plant waste or algae will not be achievable in large or cheap enough quantities to make sense for military applications in the next decade**, concluded the report penned by the RAND Corporation. "**The use of alternative fuels offers the armed services no direct military benefit**," it added, urging the military and Congress to rethink dedicating defense appropriations to alternative fuels research. Though the Defense Department has said using more renewable energy will reduce the need for fuel convoys in the battle zone, RAND questions biofuel's role in that effort, saying that **any alternative fuels** -- either with biofuel blends or coal-to-liquid technology -- **would still require** those **fuel convoys or compound logistical challenges** on the front lines. "In short, **the military is best served by efforts directed at using energy more efficiently in weapon systems and at military installations**," it said.

## Neg- Biofuels

#### Biofuels Would Be Difficult To Set In Place And Inefficient

The Navy's Use of Biofuels is Inefficient and Costly

**Pyle, 7-19-12** (Thomas Pyle, 07-19-12, usnews, “The Navy’s Use of Biofuels is inefficient and costly”

<http://www.usnews.com/opinion/blogs/on-energy/2012/07/19/the-navys-use-of-biofuels-is-inefficient-and-costly>

Thomas Pyle is the president of the Institute for Energy Research.

This week, **the Navy embarked on a costly and pointless exercise—using "advanced" biofuels that cost $26 per gallon in some naval exercises. At a time when the federal budget and military budgets are tight, Navy Secretary Ray Mabus claims that it is important to spend millions of dollars on an exotic biofuel to "enhance our national security."** That is ridiculous. **Spending $26 a gallon on exotic biofuel does not "enhance natural security"** as it **reduces our security by wasting taxpayer's dollars** on yet another renewable boondoggle and diverts funds from necessary readiness.

Nonetheless, Mabus has ordered naval exercises in the Pacific using "advanced" biofuel**. The Navy will be running a fleet of warships, including the accompanying jet planes and helicopters, on a 50-50 mixture of conventional fuel and biofuel. The fuel for this exercise cost the Navy around $12 million, but that is just a small portion of what the Obama administration has spent and will spend on the development of biofuels technology.**

**Over the past three years, this administration has spent $1 billion to research and develop these fuels partly by investing in bio-refinery projects.** In fact, these biofuel projects are part of a larger $510 million joint agency initiative between the Agriculture, Energy, and Navy Departments to invest in so-called drop-in commercial biofuels.

[See a collection of political cartoons on energy policy.]

The Navy has a contract with Dynamic Fuels LLC and Solazyme, Inc. who will be providing fuel made from chicken fat and algae oil, respectively. **The Navy claims that buying fuel from chicken fat and algae protects national security by reduce our dependence on the volatile global oil market.** Their argument might make a modicum of sense if oil prices were $1,000 a barrel, but oil "only" costs $100 a barrel. (A barrel of oil is 42 gallons and this biofuel is $26 a gallon, therefore $26 a gallons x 42 gallons = $1,092 a barrel.)

**Even with the volatility in the oil market, oil is nowhere near the $1,000 a barrel of these exotic biofuels. Instead, Brent Crude Oil is hovering around $100 and West Texas Intermediate is $86 a barrel. There is little reason to believe that these biofuels will cost near what oil costs in any foreseeable future.** That's because biofuel is old technology. Some of the first automobiles, as in the ones made in the 1800s, ran on ethanol and other biofuels and during World War I, a commercial cellulosic ethanol plant was operating in the United States. But biofuel production declined over time not because it was new, but because it was inefficient, expensive, and ultimately unsustainable.

It is no surprise that it appears that there might be more behind this biofuel initiative than national security. A federal biofuel advisory committee that serves multiple government agencies in the development of biofuels is comprised of numerous individuals who work in the green energy industries themselves, including members of the aforementioned Solazyme Inc. Harrison Dillon, the cofounder and president of Solazyme Inc., and Robert Ames, the vice president of fuels and commercialization of Solazyme Inc., both serve on the biofuel advisory committee. This is an inexcusable example of government cronyism and raises serious doubt about the legitimacy of this initiative. On top of this, Mabus has not been able to produce any type of outline that explains the ultimate costs and the time for such a project. This has led to bills in both the House and Senate currently limiting this effort by restricting the purchase of alternative fuels if they cost more than conventional oil, except for in research and development projects such as this one. Despite reality, the Navy claims that by 2016 it will have a fully functioning "Great Green Fleet," and by 2020 to have half of all naval travel running on these biofuels.

[See a collection of political cartoons on gas prices.]

**At $26 a gallon, this biofuel costs around six times more than conventional fuel. Even after being mixed with conventional fuel the price is still around $15 a gallon.** The Navy has spent $12 million for 450,000 gallons of this biofuel just for the upcoming exhibition. That same $12 million could have purchased over three million gallons of conventional fuel. Despite these numbers, Mabus has claimed, "I think we cannot afford not to do this."

Mabus' statement is utterly ridiculous and reflects an absolute lack of understanding of America, and the world's, energy realities. **People have been working on biofuel for over 125 years and they are still incredibly expensive. The United States has large oil resources—enough for 200 years in fact at prices well below $26 a gallon.** Why Mabus would rather the federal government go further in debt by paying for expensive fuels instead of using Americans resources is not at all clear.

Because the Navy is showing a disregard for taxpayer dollars or national security, the Institute for Energy Research this week sent letters to Congress calling for an "immediate, exhausting, and unyielding investigation" into this blatant abuse. We asked them to review the Navy's partnerships with the companies involved, as these deals have obviously been made due to factors other than national security and energy independence.

[See a slide show of a reality check on U.S. energy sources.]

We also wrote a letter to Mabus asking what the Navy has against domestic oil production. The United States has the largest oil, coal, and natural gas resources in the world. Much of these resources are on federal lands, but instead of promoting access to this fuel, Mabus is spending $26 a gallon on exotic biofuel. We asked Mabus to consider the facts about America's energy situation, cease publication of specious claims about American energy resources, and to return to the Navy's core mission of protecting national security.

**With the uncertainty in the Middle East it is possible that oil prices could rise again, but even if the Straits of Hormuz were closed, it is unlikely that the price of oil would reach the** dizzying **costs** of Mabus's **$26 a gallon biofuel** boondoggle. **For that to happen, oil would need to cost well in excess of $1,000 a barrel.** There is just no rational explanation of how spending on biofuel this expensive will actually improve national security. If Mabus were truly serious about increasing national security, he should look at America and Canada's plentiful energy resources.

#### Biofuels are expensive

#### Peterka 13 (Amanda, E&E reporter, 1/14/13, sde, “BIOFUELS: Clean, green options lacking as airlines seek alternatives to petroleum”,http://www.eenews.net/stories/1059974724 )

Airlines, plane manufacturers and airports are working together and with the military to test biofuels that airports can use in fueling infrastructure. Commercial airlines have logged more than 1,700 test flights on biofuels -- including a recent Canadian flight that for the first time soared on 100 percent biofuel -- but there's still a bumpy ride ahead. **Capital costs for biofuel producers remain high, the price of aviation jet fuel remains above that of traditional jet fuel,** policy around the globe is varied, **and uncertain and long-term contracts are nearly impossible to obtain. The renewable jet fuel market is also seeing fierce competition from the diesel market.  "**We've having the best of times and the worst of times," said Ross Macfarlane of Washington-based Climate Solutions, which has worked with Pacific Northwest airlines and airports in a regional partnership.  The issue is supply -- or rather, lack of it. **There's just not enough available biofuel to make it feasible for flight on a grand scale.**  "Anyone who is going to be making renewable fuels from readily available plant sources today, and animals and used cooking oil and greases, will have this conundrum in dealing with a real strong demand in the aviation biofuels industry but the inability to pay the premium," said Jim Rekoske, vice president and general manager of the renewable energy and chemicals business unit at UOP LLC**.  "In the short term, unless airlines are willing to pay a premium, it will be difficult to convince them" to use renewable fuels,"** he added.  Money's a big incentive, and U.S. airlines are spending gobs of it on fuel.  In 2011, airline companies spent nearly $48 billion on jet fuel for domestic and international travel**.**

#### Does not solve- biofuels not viable for aircraft

**Hileman and Stratton, 2014**. (J.I. Hileman: MIT, with the FAA. R.W. Stratton: MIT, with Bombardier Aerospace, 2-18-2014) “Alternative jet fuel feasibility” Transport Policy. [http://www.sciencedirect.com/science/article/pii/S0967070X14000493#](http://www.sciencedirect.com/science/article/pii/S0967070X14000493). CRC

Of the fuels listed in Section 4, **only the petroleum-based and synthetic fuels are compatible with the current fleet of aircraft** and are therefore potentially feasible with it **thus avoiding the high costs and long process of infrastructure changes** associated with aviation technology modifications. Alcohols (ethanol and butanol), **biodiesel, and biokerosene are not viable for use in aircraft because of the myriad problems involving their properties and the energy penalty associated with their use in aviation.** These challenges are not experienced when they are used for surface vehicles; hence, alcohol fuels, biodiesel, and biokerosene are better suited for ground transportation.

**Biofuels too expensive- Congress opposes it**

**Alexander, 2012**. (David Alexander: Writer. 11-28-2012) “Senate strikes restriction on military biofuel development” Reuters.<http://www.reuters.com/article/2012/11/28/us-usa-defense-biofuels-idUSBRE8AR17G20121128> CRC

**Spending on biofuels** by the different military services **has been controversial among lawmakers and the public because** production of initial test batches of **the new fuels costs many times more than petroleum. The Air Force** has been testing small batches of alternative fuels in its aircraft to prove they can be reliably used once prices become competitive with petroleum. It **paid $59 per gallon for 11,000 gallons for one test batch this year. The Navy** has a broader mandate to develop alternative fuels. It **spent $12 million for biofuels - more than $26 a gallon -** to power warships and aircraft **as part of its "Great Green Fleet" demonstration** this summer. Navy Secretary Ray Mabus has set a goal of using biofuels to supply about half the Navy's non-nuclear fuel needs by 2020, about 8 million barrels a year. BACKLASH IN CONGRESS He notes that biofuels could help insulate the Navy from oil market price shocks. **A one dollar increase in the price of a barrel of oil boosts the Defense Department's fuel bill by $130 million annually**. The military's focus on alternative energy sources provoked a backlash in Congress this year among **lawmakers concerned the spending was misplaced at a time when tight budgets are forcing reductions in military personnel and programs.** "What we're doing is trying to experiment in green energy at the expense of our ability to defend America and our (military) readiness," Republican Senator Jim Inhofe said in debate on the amendment. Inhofe, who inserted the restrictions on biofuels into the original bill, noted that **the military has been ordered to cut $487 billion in projected spending over the next decade and faces the possibility of another $500 billion in cuts over that period beginning in January.** "If that were not enough, **the** Obama **administration continues to force the military to spend** greater proportions of **its already depleted funds on an expensive green energy agenda**," Inhofe said.